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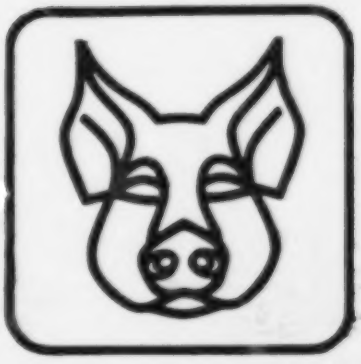

1983 MANITOBA ANIMAL INDUSTRY CONFERENCE PROCEEDINGS

A Forum for Professionals in Animal Agriculture

Manitoba Agriculture

FOREWORD

The Manitoba Animal Industry Conference were established in 1978 to meet three basic needs for professionals in animal agriculture:

1. To enable individuals in research, extension and agri-business to become better acquainted with projects, programs and activities of those in other sectors.

2. To disseminate information, often in the form of research results, on timely topics.

3. To serve as a forum for presenting the problems confronting animal agriculture and for discussing possible solutions.

The 1983 program covered a wide range of thought-provoking, informative topics and provided those in attendance with ample food for thought and discussion.

Marni Donetz
Chairman, Planning Committee

A.I.C. PLANNING COMMITTEE

Dr. Gerry Dyck
Ag. Canada
Box 610
Brandon, Manitoba
R7A 5Z7

Brian Nedohin
Manitoba Agriculture
Box 1359
Morden, Manitoba
ROG 1JO

Ron Kilmury
Cargill Grain
500-167 Lombard Avenue
Winnipeg, Manitoba
R3B OV4

Wayne Outhwaite
Agriculture Canada
624-269 Main Street
Winnipeg, Manitoba
R3C 1B2

Dr. Alma Graham
Dept. Animal Science
239 Animal Sc. Bldg.
University of Manitoba

Marni Donetz
Manitoba Agriculture
545 University Crescent
Winnipeg, Manitoba

Dr. Lloyd Campbell
Dept. Animal Science
239 Animal Sc. Bldg.
University of Manitoba

ANIMAL INDUSTRY CONFERENCE

A FORUM FOR PROFESSIONALS

Tuesday, December 13, 1983

Agriculture Auditorium, University of Manitoba

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Environmental Physiology

- An Update on Current Research at University of Manitoba -

by A.D. Graham

Dept. of Animal Science

University of Manitoba

The subject area of environmental physiology is a very broad one. Environmental factors such as humidity, light, noise, temperature, wind and air-borne pathogens all influence level of animal production. The following discussion will pertain only to thermal factors which are of known major importance in relation to production of livestock in an outdoor winter environment.

Research pertaining to the effect of winter thermal conditions on the performance of livestock is very difficult to conduct and as a result very little pertinent data are available. Some of the research difficulties are

1. winter conditions are unpredictable
2. data collection is physically difficult for the experimentor
3. control animals must be housed indoors
4. controlled environment chambers do not adequately mimic the outdoor winter environment
5. trials must be long in duration

Hidiroglou et al. 1977 compared growth and feed consumption of Hereford steers reared indoors (mean ambient temperature of 0°C) to those held outdoors (mean ambient temperature of -20°C) from November to March in Ontario. When fed grass-legume hay ad libitum the indoor and outdoor steers had similar mean monthly weight gains but those steers held outdoors consumed 15% more feed. When fed hay plus crushed barley ad libitum both gain and feed consumption were similar in indoor and outdoor exposed animals.

The steers fed grain plus hay were probably not stressed by the outside environment. The high level of intake would be expected to provide a high heat increment which would eliminate the necessity to channel feed energy towards thermoregulatory heat production. The steers fed only roughage would have had to raise their heat production by shivering or other means to ensure that body temperature remained constant throughout the winter. The study by Hideroglou et al. 1977 emphasizes that the cost of winter is most pronounced when animals are on a low level of energy intake. Overwintering cows fed at maintenance or less would be in a similar cold stress circumstance to the slow growing steers fed only roughage.

Formulae are available for calculating the increase in feed required during inclement winter periods. In the text published by the NRC Subcommittee on Environmental Stress it is suggested that a dry pregnant cow would require 0.334 MCal ME/day (2%) extra feed per day for each degree that the ambient temperature was below the lower critical temperature (LCT) of the cow. The LCT is the ambient temperature below which the cow must increase heat production in order to maintain a constant body core temperature. Homeothermic animals will increase heat production such that resting heat production plus thermoregulatory heat production equal rate of heat loss. The formula recommended by NRC for calculating the increase in maintenance energy requirement is as follows:

$ME^* = A(LCT-T)/I$

ME* = increase in maintenance energy requirement

A = body surface area = 0.09 kg $B.W.^{0.75}$

LCT = lower critical temperature

T = effective ambient temperature (^oC)

I = total insulation

The value for I varies with wind speed. The extra feed requirement estimate is just that, an estimate because surface area and insulation are estimations and because the value for LCT is not known for cows of different breeds, body condition and age.

Three physiological responses to cold environments which are responsible for the increase in amount of feed required are:

1. the immediate shivering response
2. long term metabolic acclimatization
3. increased rate of passage of digesta through the gastrointestinal tract

The magnitude of each seems linearly related to the severity of the cold stress.

In summary, physiologists can predict that winter conditions, if severe enough, will affect feed requirements of cattle and we can predict the magnitude of this effect for the average animal.

Current Research

The current task is to develop ways of assessing the effect of winter on animals which may physically and physiologically differ from the average animal.

Agriculture Canada at Lethbridge and Brandon has undertaken a study to compare the winter feed requirements of British and Exotic cross brood cows. Winter feed requirements will be derived from these studies but it cannot be determined what proportion of the winter feed is used to combat climatic stresses. Indoor facilities for control animals sheltered from the winter environment are not available.

The Department of Animal Science, University of Manitoba is now working with the Brandon researchers with the financial aid of an Agriculture Canada contract. The objectives of the university aspect of the Foreign Cattle Breed evaluation study is to compare between breed crosses:

a) degree of internal and external insulation

b) body size

c) body conformation

d) behavioral responses to the winter environment

e) thermal comfort

Research conducted during the 1983/84 winter is thought to be preliminary in nature and is to be followed by three full winters of data collection. Pregnant cows which are crosses of Simmental with Charolais with Shorthorn, Hereford and Angus as well as the Hereford-Angus cross are to be studied.

To meet the study objectives:

I) Monthly measurements of coat length and hair weight/unit area and ultrasonic backfat will be used as indices of insulation.

II) Body profile and ear photographs will be used to assess body size and surface area.

III) Photography will also be used to compare animal grouping tendency and individual animal orientation to wind and sun.

IV) Direct observations will be made of hunching behavior and piloerection. Both characteristics will indicate the thermal comfort of the animals at the time of observation.

V) A radiotelemetric method will be used to frequently monitor the subcutaneous ear temperature of 150 cows each year. Radiotelemetry involves the transmitting and receiving of a radio signal which indicates

the physiological parameter under study. Ear temperature is thought to be indicative of the thermal comfort of the animal because the blood vessels within the ear skin dilate and constrict in relation to the animal's need to lose heat from the body. Thus, those cows which "feel" cold on a particular day will have constricted ear blood vessels while those which feel "warm" will have dilated ear blood vessels. The temperature of the ear is directly related to the degree of blood flow because the ear itself has very little heat generating capacity.

To monitor ear temperature a small temperature sensor is implanted under the ear skin and is connected by a short wire to a case containing the electronics necessary for sending a radio signal. A receiver, located within one km distance, will pick up the individual radio signals from all animals and will translate the information into meaningful numbers to be automatically stored on a computer. The transmitters are designed to function continuously for three years.

Ear temperature data as well as environmental data such as wind speed, air temperature and solar radiation will be collected every two minutes throughout each winter. Ear temperature data collection at very frequent intervals over three winter periods will insure that a wide variety of weather conditions are studied. The use of telemetry allows for data collection without interference by the experimenter. This serves the function of preventing erroneous data due to psychic stress of the animals and allows data to be collected on even the most bitterly cold winter days as well as during weekends and night-time hours.

Summary

The behavioral and ear temperature aspect of the study will provide quantitative information about the degree by which cows of different

genetic background are stressed by the Manitoba winter conditions. The data on insulation and body shape and size may clarify what factors are responsible for any differences in cold tolerance found.

References

National Research Council (U.S.). Effect of Environment on Nutrient Requirements of Domestic Animals. National Academy Press, Washington, D.C. 1981.

Hidiroglou, M., Ivan, M. and Lessard, J.R. 1977. Can. J. Anim. Sci. 57:519-529.

Manitoba Agriculture

Livestock Industry

Task Group

L. McNichol

THE PRODUCTION AND MARKETING SYSTEM FOR LIVESTOCK PRODUCTS INVOLVES THE INTERACTION OF THE FORAGE, GRAIN AND LIVESTOCK SECTORS. OUR REPORT HAS ATTEMPTED TO HIGHLIGHT THE INTERPLAY OF THESE SECTORS.

WE MUST RECOGNIZE THAT SIMPLY EXPANDING THE NUMBER OF CATTLE AND HOGS ON FARMS IS NOT THE SOLUTION TO IMPROVING OUR INDUSTRY. OUR PRODUCT MUST COMPETE ON THE NORTH AMERICAN MARKET AND AS SUCH OUR PRODUCERS ARE PRICE-TAKERS. SUPPLY-MANAGED COMMODITIES ARE ALSO LIMITED BY QUOTAS.

IF MANITOBA IS TO IMPROVE ITS LIVESTOCK SECTOR, THE FINAL PRODUCT MUST BE PRODUCED AT THE LEAST COST POSSIBLE. THIS STATEMENT IMPLIES IMPROVED ANIMAL HEALTH MANAGEMENT, IMPROVED PRODUCTION/HANDLING FACILITIES, ASSISTANCE IN TECHNOLOGY TRANSFER AND ADOPTION. RESEARCH IN THE DEVELOPMENT OF BETTER FORAGES, FEEDS, FEEDING SYSTEMS AND REARING FACILITIES. THE PROMOTION OF A.I. AND SUPERIOR BREEDING STOCK, INCREASED USEAGE OF PRODUCTION/FINANCIAL RECORD KEEPING SYSTEMS, AND MORE INTENSIVE USE OF CLASSES 4,5 AND 6 LAND FOR FORAGE PRODUCTION.

POLICY DEVELOPMENT BRANCH

NOVEMBER 29TH, 1983

FORAGES

The Task Group was aware of the problems associated with having most forage legumes and grasses originating from U.S. breeding stock. Often the product is not suitable to the Manitoba climate and soils.

The report, therefore, emphasized the need for:

1. A forage grass breeding programs.

2. Support for alfalfa breeding and perennial forage legume evaluation by researchers.

3. In-province testing and evaluation.

To ensure the best usage of marginal lands, the Committee recommended:

1. Producer education programs on forage production, handling, storage and processing.

2. Incentives for forage development (clearing land, establishing crops).

3. On-farm demonstrations of livestock handling systems.

Other major areas of concern were:

1. Updating the hay grading regulations.

2. Establishing a hay listing system.

B E E F

ADEQUATE PASTURE HANDLING FACILITIES ARE THE KEY TO ENSURING GOOD MANAGEMENT OF PASTURES. FOR THIS REASON, ON-FARM DEMONSTRATIONS OF HANDLING EQUIPMENT AND PRODUCER EDUCATION RE DESIGN AND CONSTRUCTION WERE IDENTIFIED AS POTENTIAL INITIATIVES.

AS REDUCING PRODUCTION COSTS IS THE KEY TO IMPROVING THE PRODUCER'S PROFIT MARGIN, EMPHASIS WAS PLACED ON:

1. INCREASED USE OF FEED ANALYSIS AND RATION BALANCING.(THE COMMITTEE RECOGNIZED THE NEED TO SPEED UP THIS SERVICE AND INCREASE ANALYSIS CAPABILITIES.
2. ADOPTION OF GENETIC IMPROVEMENT PROGRAMS - CROSSBREEDING, ARTIFICIAL INSEMINATION, PREGNANCY TESTING, BULL TESTING AND RECORD OF PERFORMANCE SYSTEMS.
3. FARM FINANCIAL AND MANAGEMENT RECORD KEEPING AND ANALYSIS.
4. INCREASED PARTICIPATION IN A HERD HEALTH MANAGEMENT PROGRAM.

OTHER MAJOR AREAS OF CONCERN WERE:

1. RESEARCH INTO(A)TRACE MINERAL DEFICIENCIES.
   (B)NUTRITIONAL REQUIREMENT OF CROSSBRED CATTLE.
2. PACKERS NEED TO ADOPT NEW TECHNIQUES(HOT BONING, ELECTRICAL STIMULATION).
3. PRODUCT DEVELOPMENT(CONVENIENCE, PRECOOKED FOODS).

DAIRY

As was the case for beef, increased use of feed analysis and ration balancing were identfied. In addition, emphasis was placed on:

1. Further research into butterfat depression.

2. On-farm evaluation of milking equipment.

3. Increased use of A.I.

4. Expand milk recording.

5. Mastitis health program - need for equipment to test for somatic cell count. Bonus/Penalty system to encourage improved quality.

6. Need to develop markets for red and white veal.

7. Costs/Benefits of marketing bulls versus steers.

SWINE

1. Expansion of A.I. and an evaluation of live hogs.

2. Herd health program in cooperation with producer groups (Board).

3. Development of a contagious disease eradication program.

4. Research problems affecting pork quality (Boar Taint, PSE).

5. Research into effects air quality and the environment have on pig growth in confinement.

6. Development of new equipment and adaptation of existing equipment.

7. Training program for managers/labourers.

8. Record keeping - expansion and perhaps development of a province-wide computerized system.

9. Producer education re problems encountered in domestic and foreign marketing of pork.

CHICKEN

Recommendations:

1. Cost/Benefit analysis of broiler medicating costs.

2. Study of mortality patterns in broiler breeder barns.

3. Awareness of costs/benefits of feed intake and weight monitoring system.

4. Assess usage of excess barn capacity for product for export markets.

5. Record keeping.

TURKEY

Recommendations:

1. Analysis of ventilation requirements for turkey brooding units.

2. Assess costs/benefits of shed versus range rearing turkeys.

3. Awareness of costs/benefits of feed intake and weight monitoring system.

4. Assess usage of excess barn capacity.

5. Record keeping.

EGGS

Recommendations:

1. Evaluation of fluorescent lighting on egg production.

2. Feed intake/weight monitoring.

3. Assess cracks at retail level.

4. Record keeping.

SHEEP

Recommendations:

1. Intensive grazing use - demostration of low-cost fencing for pastures.

2. Genetic selection programs - A.I. usage and semen storage facility.

3. Research into acceptable forages.

4. Demonstrations of accelerated lambing and lamb feeding trials to encourage uniform carcass quality and year-round supplies.

5. Identify management practices suitable to Manitoba.

6. Record keeping.

7. Promotion of freezer, HRI and retail markets.

Copper - The Manitoba Situation

T.J. Devlin & R.J. Boila

The copper (Cu) problem has been with us in Manitoba for many years and, indeed, has been recognized worldwide. Two forms of Cu deficiency have been observed -- a primary Cu deficiency due solely to an insufficiency of Cu in the diet or a secondary Cu deficiency due to an excess of molybdenum (Mo) and/or sulfur in the diet. Both deficiencies have been diagnosed either by a low level of Cu intake (<10 mg/kg of diet) of by a low level of Cu in the blood (<0.6 µg/ml). Superficially this would seem reasonable, however, the primary deficiency is a simple result of a lack of Cu while the secondary deficiency due to excessive levels of Mo and/or sulfur results in a reduction in the availability of the dietary Cu or a complexing of the absorbed Cu in the animal body. Thus the aforementioned analytical criteria may or may not provide accurate information on the Cu status of the animal.

Over the last several years several studies dealing with Cu deficiencies in cattle have been undertaken in Manitoba. Extensive studies on the Cu and Mo content of forage crops grown in Northwestern Manitoba have also been undertaken. In general it can be concluded that the concentration of Cu in grasses was usually about 5 ppm and rarely above 10 ppm, thus making them potential contributors to a primary Cu deficiency. Legumes have contained higher levels of Cu than grasses when grown at the same location thus indicating their ability to accumulate Cu, and therefore are more likely to contain 10 ppm of Cu or more.

The Cu content of forages, although of some major significance must also be considered in conjunction with the dietary intake of Mo and sulfur.

Based on survey data, the geographical location of grasses and legumes with greater than 5 ppm Mo (D.M. basis) was related to the Eastern boundary of the Ashville Formation (separates N.W. Manitoba into two distinct areas).

Grasses grown West of the boundary may contain more than 5 ppm Mo. The geographical distribution of legumes with more than 5 ppm Mo was not as well defined. Only when the location of legumes with more than 10 ppm Mo was considered was there an agreement with grasses with more than 5 ppm Mo. In the Eastern Lowlands of N.W. Manitoba, high moisture conditions in the soil would favor the uptake of soil Mo by legumes.

In the Upland area, most notably the Roblin area, grasses had a much higher content of Mo than legumes; Mo levels for grasses were greater than 10 ppm at many sites. Suffice it to say that some precautions should be observed when identifying whether a legume or a grass forage would have the highest Mo content when grown together at the same location.

The total sulfur (S) content of forages averages about 0.2% with a few forages about 0.3% but rarely above 0.4% (literature data). Notwithstanding the literature data we have analysis data for total S content of many of the forages previously mentioned and although values in the area of 0.3% are fairly common some forage material can have S levels above 0.5%. This information should tell us whether an analysis of total S as well as Cu and Mo would be required to define a Cu deficiency and in turn the supplemental Cu required for cattle.

Water sources for cattle all contain sulfur as sulfate (33% sulfur). The sulfur in water consumed by cattle would contribute significantly to a Cu deficiency if levels of sulfate (SO_4^{-2}) are excessive (>500 ppm). Sources of water which include wells, rivers, dugouts and potholes can vary significantly in sulfate content. (Table 1)

When the zinc, manganese or iron content of a forage were considered, there was no relationship with the Cu or Mo content or with the geographical distribution of Mo content relative to geology. In N.W. Manitoba both grasses & legumes were deficient in zinc (less than 40 - 50 ppm) were found in approximately 6% of all forage samples.

On average, legumes contained 3 to 5 ppm more zinc and 10 ppm less manganese than grasses and there were no differences between grasses & legumes for iron content.

Cu Requirement

Various means have been employed to estimate the Cu requirement for growth, growth of fetus & membranes in the pregnant animal and the excretion of Cu in milk.

The net requirement for Cu in growing, pregnant or lactating cattle was then estimated (ARC 1980). Table 2. A dietary requirement could be estimated if a coefficient of absorption (A) (fraction of dietary Cu that may be absorbed from the digesta in the intestinal tract) for Cu was known. This coefficient is based upon the concentration of total sulfur (S, g/kg dry matter) and molybdenum (Mo, mg/kg D.M.) in the diet.

The (ARC 1980) calculations have assumed that A equals 0.7 for the pre-ruminant calf and 0.04 for ruminating cattle. Using A = 0.04 the dietary requirement of Cu for a 500 kg animal would be 88 mg (3.5 mg Cu net/0.04 = 88 mg. Table 3).

Coefficients of absorption were calculated at various combinations of S and Mo in the diet (Table 4).

Several values have been listed as the Cu requirement for cattle (Table 3), but without a consideration for dietary intake.

A requirement of 10 ppm Cu (D.M. basis) is still applicable if enough diet is consumed with a coefficient of absorption of 0.04 or greater. For a 500 kg animal consuming 10 kg of a diet containing 10 ppm Cu, a daily intake of 100 mg Cu with a net absorption of Cu of 4 mg or higher meets the requirements of that animal.

Cu status of cattle

Cu status can be identified using liver tissue, whole blood, plasma or serum, hair or ceruloplasmin activity in plasma or serum. The best indicator

of Cu status is the concentration of Cu in liver tissue. Since ceruloplasmin is synthesized by liver tissue then it follows that its activity in serum or plasma is also an excellent indicator of Cu status. Serum Cu should only be used to identify a Cu deficiency in less than 0.6 µg/ml; however, a serum Cu greater than 0.6 µg/ml is not necessarily an indicator of Cu adequacy in the diet. Total serum Cu as analysed for in serum analysis may contain a soluble (fraction containing serum enzyme and albumin bound Cu) form and an insoluble (biologically unavailable Cu) form. Serum Cu, as analysed, does not partition these two potential Cu forms. (Table 5).

Supplementary Cu for Beef

Several methods have been used to increase the Cu levels present in forages or to supplement the diet of cattle with Cu.

1) Adding Cu salts to the soil - although addition of Cu salts to fertilizers has increased the forage level of Cu in many parts of the world, this procedure does not hold much promise in Manitoba. Studies conducted by the Dept. of Soil Science suggest that either direct incorporation into the soil, top-dressing in a granular form or foliar application in solution did not influence the subsequent concentration of Cu in brome grass or alfalfa. This is related to the moderate to strong alkalinity of our soils in contrast to moderate to strong acidic soils where these routes of administration have proved effective.

Foliar application did result in a temporary increase in forage level of Cu but does not appear to be a practical solution to the problem (Seven Sisters).

2) Adding Cu salts (Cu sulfate, Cu oxide in the powder form) to a complete diet, a protein supplement or a mineral supplement. This can be effective with a primary Cu deficiency but presents problems with secondary Cu deficiencies and where S content of the diet may not be known.

3) Injectable Cu Preparations - injectable sources evaluated were equally effective in improving the Cu status of Cu deficient cattle and preventing a drop of Cu status over the pasture season. One dose of injectable Cu at the start of the pasture season was effective for cattle containing less than 3 to 5 ppm Mo (D.M. basis). When the Mo content of forage was much higher than 5 ppm a second dose 90 days after the first appeared to be effective in maintaining cattle in an adequate Cu status. (Tables 6 & 7).

4) Cu Oxide wire & Cu sulfate oral dosing - where Cu deficiencies are not due to high Mo levels then oral dosing of Cu may be effective in maintaining liver Cu stores. Oral doses of Cu sulfate at 2 to 3 gm have been used as a quick remedy for a Cu deficiency. An oral dose of 50 g of Cu oxide in the wire form may be effective because of the retention of this Cu supplement in the digestive tract with a slow release of Cu for absorption for a period of up to 6 months.

Current Research

1) Use of a 2:1 ratio of Cu:Mo in diets containing high levels of Mo to provide adequate Cu.

2) Cu sulfate or Cu oxide in the powder form in the diet and oral doses of Cu oxide in the wire form - influence of Mo levels on response and Cu status of animals.

3) Use of injectable Cu and zinc for grazing cattle - in progress.

4) Effect of high levels of dietary Mo on Mo levels in cows milk and the Cu status of her calf.

5) Effect of Mo and S on Cu status and fertility of ram lambs - sire breed of animal can influence blood or plasma Cu.

6) Effect of Mo and S on Cu status of lambs fed different levels of Cu.

7) Evaluation of parameters that may be used to indicate Cu deficiency in sheep. Data on two Cu containing enzymes are being monitored (superoxide dismutase and cytochrome C oxidase) with animals that are depleted of liver

Cu stores.

8) Effect of intraruminal infusion of Mo and/or S upon bilary excretion of Cu in sheep.

Table 1. Estimation of the effect of sulfate in water upon the total sulfur content of the diet[1]

Concentration of sulfate in water (ppm)[2]	Water Sulfate added to diet[3] (g/kg dry matter)	Water sulfur added to diet[4] (g/kg dry matter)	Final Calculated sulfur content of diet[5] (g/kg dry matter)
500	2.5	0.8	2.8
1000	5.0	1.6	3.6
1500	7.5	2.5	4.5
2000	10.0	3.3	5.3

[1] Assumptions - 500 kg animal consuming 10 kg of dry matter with a sulfur content of 2 g/kg dry matter, and drinking 50 litres of water per day.

[2] ppm = mg per litre

[3] g sulfate per kg dry matter = 50 litres x $\frac{\text{mg sulfate/litre}}{1000 \text{ mg/g}}$ x $\frac{1}{10 \text{ kg}}$

[4] Sulfate = 33% Sulfur

[5] Final sulfur content of diet = Feed input + water input
Feed input = 2 g/kg dry matter
Water input = Calculated.

Table 2. The copper requirement of cattle

Source	Animal	Requirement ppm-Dry Matter Basis[3]
NAS-NRC[1] 1970	Beef Cattle	4
NAS-NRC 1971	Dairy Cattle	10
ARC[2] 1965	Cattle	10

[1]NAS-NRC - National Academy of Sciences, National Research Council, Washington, D.C.

[2]ARC - Agricultural Research Council, Commonwealth Agricultural Bureaux, England.

[3]ppm = parts per million = mg per kg dry matter.

Table 3. Estimated requirements of cattle for copper

CLASS OF ANIMAL	Live Weight (kg)	Rate of Gain Stage of Pregnancy, or Milk Yield	Absolute Requirement (mg Cu/day)	
			Net	Dietary[1]
Pre-Ruminant Calf	40	0.5 kg/day gain	0.81	1.16
Growing Animal	100	0.5	1.24	31
		1.0	1.76	44
	200	0.5	1.94	48
		1.0	2.45	61
	300	0.5	2.64	66
		1.0	3.16	79
Adult	500	0	3.50	88
Pregnant Cow	500	7 months	4.56	114
		9	5.64	141
Lactating Cow	500	10 kg milk	4.50	113
		20	5.50	138
		30	6.50	163

[1]Coefficients of absorption were assumed to be 0.7 for the 40 kg pre-ruminant calf, and 0.04 for all ruminating cattle.

Coefficients of absorption will vary with the concentration of sulfur and molybdenum in the diet.

Table 4. Calculated coefficients of absorption for dietary copper at various combinations of total sulfur (1, 2, 3 and 4 g/kg dry matter) and molybdenum (1, 5, 10 and 15 mg/kg dry matter) in the diet.[1]

Molybdenum (mg/kg Dry matter)	Sulfur (g/kg Dry Matter)			
	1	2	3	4
1	0.057	0.047	0.038	0.031
5	0.051	0.037	0.027	0.019
10	0.044	0.027	0.017	0.011
15	0.038	0.020	0.011	0.006

[1]The coefficients of absorption were calculated:

$$\log [A] = -1.153 - 0.076 (S) - 0.013 (S \times Mo)$$

S = Sulfur g/kg dry matter

Mo = Molybdenum mg/kg dry matter

Table 5. The concentration of Cu sulfate or its Cu equivalent in a pasture mineral supplement that should be present in order to meet the Cu requirement of cattle grazing pastures with different concentrations of molybdenum in the forage[1].

Concentration of Mo (ppm)[2]	Concentration in mineral supplement	
	Cu sulfate (per cent)	Cu (per cent)
less than 5	1	0.25
greater than 5 & less than 10	2	0.50
greater than 10 & less than 15	3	0.75

[1]The forage should contain a minimum of 5 ppm copper and a maximum of 3 g total sulfur per kg dry matter

[2]ppm = parts per million or mg per kg.

Table 6. The mean concentration of copper in blood serum of cattle dosed with four different preparations of injectable copper salts in comparison to a group of cattle that received no dose of injectable copper.

Treatment	Number[1]	Day of test period			
		Day 0	Day 30	Day 60	Day 90
1) Untreated[2]	28	0.65[3]	0.71a	0.65a	0.59a
2) CuCaEDTA	27	0.65	0.80ab	0.71ab	0.71b
3) Cu Glycinate (NZ)	25	0.63	0.80ab	0.72ab	0.71b
4) Cu Glycinate (US)	27	0.67	0.82b	0.79b	0.70b
5) Cu Methionate	26	0.63	0.86b	0.73b	0.72b
SE	--	----	0.024	0.023	0.025

[1]Total number of animal was 133. This included only those animal for which data were available for Days 0, 30, 60 & 90

[2]Untreated - a non-injected control group of cattle

[3]Concentration was expressed as µg Cu per ml blood serum

a, b - $P<0.05$ within columns.

Table 7. Percent of cattle with reactions at the site of injection and the severity of reaction at 30 days post injection

Treatment	Number[1]	Percent with Reaction	Severity of Reaction[2]
1) CuCaEDTA	54	6	moderate
2) Cu Glycinate (NZ)	52	23	moderate
3) Cu Glycinate (US)	55	48	moderate to moderately severe
4) Cu Methionate	57	89	moderate to severe [3]

[1]This included all of the cattle treated at Day 0. At day 30 approximately one-half of the cattle were given a different treatment and not included in the data listed in Table 1.

[2]The severity of reaction was defined by the area (cm^2) that was swollen about the site of injection.
moderate - less than 25 cm^2 affected
severe - more than 50 cm^2 affected

[3]Areas of up to 200 cm^2 were affected when copper methionate was injected subcutaneously into cattle.

Early Nutrition of the Laying Hen

L. D. Campbell

Provided that a pullet has been reared properly it is probable that with regard to optimum production the period from housing in the laying facility through peak production is the most critical. At this point in the life of the bird major changes in metabolism occur as sexual maturity is achieved and egg output proceeds to a maximum rate. Alterations in nutrient intake must accompany these metabolic changes. Along with the nutritional stress placed on the pullet at the onset of production, considerable enivronmental stress may also be encountered. All these factors contribute to the critical nature of this time period in the life of the pullet. Time does not permit a discussion of all the important management and feeding practises relating to optimum egg production. This paper will deal with the potential implications of inadequate nutrition during the critical period of the life of the pullet. The factors affecting the attainment of optimum egg size will be emphasized.

In the rearing program of pullets major emphasis is placed on producing a pullet of optimum body weight at onset of production. Over the years a pullet of low body weight and minimal body fat has proven to produce the best results provided oviduct development is sufficient to allow a rapid progression to large egg size. In addition to being of lower body size the modern pullet comes into production at a younger age and tends to achieve peak production more quickly than pullets of a few years ago. The combination of these factors increases the nutritional stress on the pullet and enhances the critical nature of the time

period from point of lay to peak production with regard to optimum egg output. Optimum intake of nutrients - especially energy, amino acids and calcium is vital at this critical period. Energy needs are very critical since the pullet has little or no body reserves and must balance the accelerated demand for energy as the rate of egg production becomes maximal with increased intake. The bird is not as well equipped as the dairy cow to function at a negative energy balance during the early phases of the production cycle. Optimum amino acid nutrition is important to meet the various needs of the pullet at the onset of production. Dietary protein must reflect the amino acid needs for gain in body mass including oviduct and ova development as well as for the synthesis of egg proteins. Slight changes in the complement of amino acids required in the diet could be rationalized as the pullet matures. The management of calcium additions to the diet of the modern pullet at the onset of production is critical. It is important that additional calcium be added to the diet soon enough since the rapid rise to peak production among a flock of pullets could result in some pullets being predisposed to cage-layer fatigue if the initiation of the layer-type diet is delayed too long. Due to the extreme nutritional stress placed on the pullet during the critical period of production it has been postulated that the modern pullet is less able to cope with additional stress in the form of adverse environmental conditions at this time. Certainly good management is essential to minimize the total stress of the bird during this critical time.

In terms of optimum egg production the attainment of an accelerated progression in egg size may not be the most conspicuous but ultimately is likely of the most importance economically to the producer. This view is strengthened by the fact that many variables that influence this phenomenon also influence total egg production. The weight of eggs for the various categories within A

grade are shown in Table 1 along with current prices for each category. The economic advantage of moving as quickly as possible to eggs of A large or better is obvious from this data. Of the nutritional stresses placed on the pullet it may be that the ability of the pullet to meet the accelerated demand for energy would be the most critical factor influencing the attainment of an optimum progression in egg size. Adequate intake of critical essential amino acids cannot be overlooked nor can the intake of essential fatty acids. The aspect of amino acid intake is fairly straightforward whereas the influence of essential fatty acids or more specifically linoleic acid is more controversial. The need for an optimum energy intake by the pullet while obvious because of the stated demands is less easy to attain under practical field conditions.

Linoleic acid appears to play a role in determining egg size in poultry. Early literature on this subject tended to indicate that the intake of linoleic acid required for optimum egg weight was higher than that need for egg production, hatchability, fertility or growth. Controversy exists, however, regarding the exact level of dietary linoleic acid needed for optimum egg size but values in excess of 2% of the diet have been quoted. A specific role for this relatively high dietary level of linoleic acid in maintaining optimum egg size in laying hens has been questioned recently due to possible confounding effects of diet fat content and diet linoleic acid content. In most experiments where the effects of linoleic acid on egg weight were studied varied diet levels of linoleic acid were obtained by varying the diet content of an oil containing a relatively high level of this nutrient. In this regard the effect of diet fat level, per se, was not adequately controlled for.

Recently Whitehead (1981) studied the relationship between dietary fat content and fatty acid composition and egg weight. Four diets containing different amounts of vegetable oil (corn oil high in linoleic acid or olive oil

low in linoleic acid) were fed to White Leghorn hens throughout a full production year. The diets were calculated to be adequate in all known nutrients other than fat and were of the same nitrogen and energy contents, the latter being confirmed by measurements of true metabolizable energy content.

The basal diet contained low concentrations of fat (2.5%) and linoleic acid (0.65%). Egg production was adequate on this diet but egg weight was low throughout the experiment. The addition of 0.4 and 3.0 percent corn oil to the basal diet corresponding to linoleic acid contents of 0.88 and 2.3% respectively, increased mean egg weight by 0.54 and 2.44 g respectively. The addition, however, of 3.0% olive oil to the basal diet representing a linoleic acid content of 0.87% gave a response similar to the high corn oil diet. The results are summarized in Table 2.

It was concluded from these studies that an oil rich in oleic acid (olive oil) was as effective as one rich in linoleic acid (corn oil) in promoting egg size. It was therefore concluded that the linoleic acid requirement of the laying hen is not greater than 0.9%. Conversely the total amount of absorbable fat in the diet was shown to be an important factor in egg weight.

Summers and Leeson (1983) suggested that body weight of the pullet at point of lay is a significant factor regarding egg size. Pullets categorized into four groups according to body weight at 18 weeks of age showed significant differences in mean egg size during a subsequent 6-week period. The heaviest birds laid the heaviest eggs (Table 3). These data confirm earlier work of Creger (1979) who demonstrated a similar response in a flock of underweight 20-week old pullets. The flock was divided into three weight groups and egg weight was followed on individual birds for a 3-month period. The data indicated that at the end of three months of lay the smaller- and medium-sized birds had not attained the egg size of the heavier birds in the flock (Table 4). The extent

to which the influence of body weight on egg size is as a consequence of pullet management, nutrition regimen or genetics of the bird requires clarification. Clearly under some circumstances nutrition may play a significant role. As indicated above the lightweight pullet has little if any body reserves of energy and hence must be able to respond to changes in energy demand by modification in dietary intake. If possible diets should be formulated in a manner to allow the birds to cope with the stress of increased energy demand.

It can be demonstrated in the laying hen that it is energetically more efficient to deposit exogenous or dietary fat directly in the egg than to deposit endogenous fat that has been synthesized from ingested dietary carbohydrate. Consequently in the pullet experiencing difficulty increasing energy intake to meet the accelerated demand for energy it would seem advantageous to use as much dietary fat as possible for yolk synthesis. The extent to which fat should be provided in the diet of the pullet for this purpose requires classification. Clearly diets not supplemented with fat would not provide enough fat to meet the daily needs of the pullet at peak production. At this point in the laying, cycle approximately 5 grams of fat would be deposited in the egg daily. Unless a dietary fat level in excess of 5% of the diet were provided a significant proportion of the fat would have to be synthesized from carbohydrate. In addition to providing an energetically efficient source of yolk lipid, supplementary fat has other advantages. The aspect of an extra caloric effect of fat in laying hen nutrition is well documented (Mateos and Sell, 1981). It is argued that supplemental fat enhances the digestion of other diet constituents as a consequence of a reduced passage rate of ingesta in fat-supplemented as compared with control diets. The advantage of this phenomenon with regard to amino acid and calcium nutrition require further clarification.

As indicated above in the studies relating to linoleic acid requirement of laying hens the fat content, per se, is an important determinant of egg size. In this regard Jensen (1983) summarized studies from the University of Georgia demonstrating that supplemental fat used during the first 16 weeks of egg production generally resulted in an accelerated increase in egg size. The studies included the use of animal fat, poultry oil and corn oil fed at levels of 4 and 8 percent in isocaloric and non-isocaloric diets. The data are summarized in Table 5. The practical application of this data requires further clarification be achieved to minimize nutritional stress. With regard to essential fatty acids the dietary requirement would appear to be less than 0.9% of the diet. The extent to which this can be met by practical commercially available feed ingredients requires clarification. Although on a theoretical basis the fortification of the diet of the pullet with fat as a means of improving egg sine can be justified, the economic feasibility of this practice requires further clarification.

References

Creger, C.R. 1979. Poor peaking - it could be underweight pullets. Poultry Digest, May, pp. 266.

Jensen, L.S. 1983. Value of fat in improving egg size examined. Feedstuffs 55:15.

Mateos, G.G. and J.L. Sell. 1981. Metabolizable energy of supplemental fat as related to dietary fat level and methods of estimation. Poultry Science 60:1509.

Summers, J.D. and S. Leeson. 1983. Factors influencing early egg size. Poultry Science 62:1155.

Whitehead, C.C. 1981. The response of egg weight to the inclusion of different amounts of vegetable oil and linoleic acid in the diet of laying hens. British Poultry Science 22:525.

Table 1. Egg size categories and current prices

Egg size Category	Egg weights not less than	Egg weights less than	Price $/doz
X large	64 g	--	1.02
Large	56 g	--	1.01
Medium	49 g	56 g	0.84
Small	42 g	49 g	0.51
Pee wee	--	42 g	0.12

Table 2. Effect of fat type and linoleic acid on laying hen performance

	Diet 1	2	3	4	Signif. of treatment effect
Fat type	none	corn oil	olive oil	corn oil	
Fat level %	2.5	2.9	5.5	5.5	
Linoleic acid %	0.65	0.88	0.87	2.28	
Mean egg production % hen day	77.9	78.5	78.1	77.3	NS
Mean egg weight (g)	56.7	57.3	58.8	59.2	*
Feed consumption g/bird/day	115	116	116	116	NS
Body weight at 18 weeks (kg)	1.28	1.29	1.29	1.28	NS
Body weight at 73 weeks (kg)	1.70	1.72	1.74	1.75	*

Table 3. Relation of egg weight to body weight in Leghorn pullets

Group	18 week Body weight	Performance 19-25 weeks Egg Production	Egg Weight
	g	%	g
1	1107[a]	48.1[a]	26.9[a]
2	1205[b]	51.0[ab]	48.4[b]
3	1281[c]	50.7[ab]	48.8[bc]
4	1383[d]	53.6[b]	49.7[c]

a b c means within a column followed by the same superscript do not differ significantly ($P<0.01$)

Table 4. Average size of eggs from an underweight group of hens categorized as to weight at 20 weeks of age.

Group	Average weight (g)	Average egg weight (g)		
		1st month	2nd month	3rd month
1	926	42.2	48.6	52.0
2	1026	44.2	50.2	52.6
3	1153	45.8	50.5	53.4

Table 5. Effect of Dietary Fat and Energy Level on Performance of Pullets from 22-38 weeks of age

Fat Source	Level	Dietary ME kcal/kg	Egg weight category (%) small/ medium	large/ ex. large
Control	--	2870	48.7	40.5
Poultry oil	4	3012	42.7	56.0
Poultry oil	8	3166	36.1	61.8
Poultry oil	4	2870[1]	37.8	60.8
Poultry oil	8	2870[1]	38.5	60.3

[1]Diets were diluted with soybean hulls to be isocaloric with controls

Tallow and corn oil gave similar results to poultry oil

Dec. 13/83

PRICING OF MEAT AND POULTRY
A DISCUSSION OF HOW PRICES ARE DETERMINED AND FACTORS AFFECTING THEM

By P. J. Gall

Mr. Chairman (Mr. Ron Kilmury, Cargill Grain)

Fellow Guest Speakers
Ladies & Gentlemen

If I were addressing you 30 years ago my job would have been a lot easier.

Before over capacity in slaughtering and processing became a recent reality, the meat processor controlled his market place and was dependent on marketing and product promotion at retail level to move volume.

In the last 30 years we have had developments in processing, packaging and transportation which along with the maturing of (HRI) Hospitality Business have added many new factors into the traditional market place.

Simultaneously in the same time factor many more specialized commodity and processing plants were constructed by independents and major packers.

All the while Canada's population maintained a slow, steady growth (especially Manitoba and Saskatchewan).

After World War II, Korea and Vietnam, with the reduction in armed forces feeding programs, the export markets were quickly coming into line and packers had to turn their attentions back to depending on the local North American market along with specialized product exports to offshore countries (i.e., pork to Japan).

By now our production capacities far exceeded our needs and consequently the Packing Industry had now entered an era when returns on investments would in many cases be non-existent, especially in commodity operations. Specialized further processing plants,were able to "control" their production and markets more easily, and continued to prosper and grow by servicing a new industry, the Hospitality Field.

Traditionally we have always spoken of the red meat and white meat sectors. While these are two competitive areas, there

are competitive products in each area as well.

Defined more simply the red meat sector consists of:

1) Beef
2) Pork
3) Veal
4) Lamb & Mutton

While the white meat sector consists of:

1) Chicken
2) Turkeys
3) Geese
4) Ducks

Since 1948 our per capita consumption has increased from 143.2 lbs. to a high of 219.3 lbs. in 1977, and more recently leveled off at 209.0 lbs. in 1982.

For a more dramatic presentation of the very competitiveness of each sector the following figures speak for themselves.

PRODUCT (lbs.)	1948	1982	Gain (Loss)	/48
Beef	59.2	89.1	29.9	50.5%
Veal	10.6	3.7	(6.9)	(65.1%)
Lamb & Mutton*	3.2	1.6	(1.6)	(50.0%)
Pork	48.0	61.5	13.5	28.1%
Misc.**	7.9	2.8	(5.1)	(64.6%)
Red Meats in Total	128.9	158.7	29.8	18.7%
Poultry	14.3	50.3	36.0	251.7%
Total Per Capita	143.2	209.0	65.8	45.9%

* Lamb & Mutton includes Mutton for cook room production.

** Misc.-- accounts for all by-products derived from offals.

In order to establish a selling price we must first go to the market place to procure our raw material.

CATTLE: In the past several years Stabalization Boards or Commissions have been introduced into the market place, and settlements at packing house level are now made on a Rail Grade Basis (over 75%).

At one time a packer's agent could purchase an animal on the farm or in the stockyard by live weight per pound or by the total value of the animal. If a buyer did his job well the odds were in his favour that his buy would have been profitable.

Today when a buyer purchases livestock through one of the provincial agencies, the odds are not in his favour. Cattle are sold in lots, sight unseen and in many cases are finished by non-professionals. Although the packer will pay on value received by "Rail Grade System," many times he will have to purchase more than needed to obtain the right grade, weight and number to ship loads to Eastern Canada. In Manitoba it is not unusual to purchase 150 steers in order to ship 90 on a rail car.

HOGS: Many provinces have marketing boards that are operated by producers who can control their supplies more easily than cattle producers. Some provinces use a teletype system to purchase lot offerings, while in Manitoba, buyers must attend a Dutch Clock Auction everyday at the Manitoba Hog Commission Building on Marion Street. Hogs are sold on a hot dressed weight basis with an index grade based at 100. The higher the index the better the hog and conversely the lower the index, the lower the value. The lot sizes are 100 hogs give or take 10%.

LAMBS: This industry is known as a farm gate industry and has an association of producers. Lambs are sold on a live weight basis to a packer. There is no control on size or grades and in recent years has suffered with competitive New Zealand imports.

VEAL: The real veal industry is in Ontario and Quebec, where "Provimi" veal is readily available. Manitoba raises a "red" veal calf which is used more for boning than for resale at retail. Calves are purchased through the stockyards or direct from producers, on a live weight per pound basis.

CHICKEN & TURKEYS: Are purchased from independent producers. Quotas are set by national and provincial marketing boards. Provincial boards set live prices and are usually tied into cost of production and recently inventory levels have been taken into consideration on a more serious note. Chickens have a flat price while turkeys are graded.

GEESE & DUCKS: Are not under any controls and are raised freely and sold to the highest bidder on a live weight basis.

Now that we have purchased our "raw materials" we are ready to start the peliminary stages of marketing.

In Manitoba almost all slaughtering and processing plants handle more than one commodity whether red meats or white meats. In the case of redmeats, major plants such as Canada Packers and Burns have further processing and canning operations.

Multi-purpose plants were designed to use as much of the animal as possible especially pork in further processing. A system of internal transfer prices was developed over the years which also became the basis for broker carload trading when a packer tried to balance his raw materials inventory to his live buy.

To service this market, brokers and reporting systems have evolved and been refined. In the U.S.A. the Yellow Sheet, a daily market and news service issued by the National Provisioner along with the Chicago Daily Hide and Tallow Bulletin, are more commonly used while in Canada, the L. N. Reynolds Weekly Report, R. A. Chisholm Weekly Report and The Westcoast News Weekly Report by H. Cleveland & Co. Ltd. are the respected "Bibles."

FIXED OVERHEADS: Every plant has a product mix which when departmentalized by weight, will have an allocated fixed cost. This cost will vary by increases and decreases in volume. Allowances are made on the weekly balance sheets. For the purpose of weekly costing an established "mean" is used.

VARIABLE OVERHEADS: Many plants are labour intensive and were built prior to 1959 when the hourly rate was $1.81 per hour with limited fringe benefits. Today's rates and fringe benefits can average up to $15.00 per hour. Therefore many plants today have tried to modernize where possible to be in a position to work with a minimum crew and yet have the capacity with unskilled labour to reach for additional volume when necessary.

ADMINISTRATION-STORAGE-INTEREST OVERHEADS: In the past few years with high interest rates and increased storage costs (today's quick calculation-- 2½¢ per lb. per dollar value per month), packers have taken a new approach when confronted with anticipated surplus-- unless a packer has the ability to further process a commodity, the rule of thumb is "the first lost is the best loss." Many packing plants today have virtually eliminated their marketing divisions and are dependent on sales personnel more and more. Senior and middle management are carrying heavier work loads in an effort to reduce some of the variable costs.

In the preceeding paragraphs I have tried to give you a simple outline of the basics:

1) Procurement of raw materials
2) Processing of raw materials
3) Overheads to be considered

Let us now assume that our finished goods are now saleable and at the shipping door ready to be delivered. PLEASE REMEMBER WE ARE DEALING WITH PERISHABLE GOODS WITH VIRTUALLY NO OR LIMITED SHELF LIFE.

BEEF: The beef manager is aware of North American market

conditions and is prepared to sell his product at a profit to the long standing customer or the highest bidder.

Product can be sold in many ways as a fresh commodity:

1) Carcass sides, quarters or primal cuts
2) Block ready sides,quarters or primal cuts
3) H.R.I. vacuum packed cuts
4) Boneless beef and beef trimmings
5) Ground beef and steakettes.

His market place is:

1) Local retail stores
2) Eastern meat wholesalers
3) Eastern or western retail commissaries
4) Purveyors
5) Further processors
6) H.R.I. (direct sales)
7) Export markets (U.S.A.-- cows, etc.).

In most businesses when a product is manufactured, costs are added to the raw materials and all are passed on to the purchaser. However, in the meat industry this is not the case.

The Eastern Market Settlement determines the final price on most choice red meats, while cows are also settled in Eastern Canada, there is a close relationship to the U.S.A.'s Yellow Sheet. With carcass cows if there is no embargo, the U.S.A.

in most cases is a preferred customer, considering our current dollar value.

These Eastern prices less freight, is what a retailer will take into consideration when obtaining his weekly quotes. Computers are being used more and more at retail level to determine best cutting returns and what specific cuts should be purchased, and in some cases when block ready involved, from what supplier.

Is this to be believed? Cattle have been purchased, slaughtered and shipped in vans or rail cars to Eastern Canada and no price has been established. In unstable market conditions, a beef manager's job is not for the weak hearted or those prone to ulcers.

With our problem of over capacity, the advent of vacuum packing and improved transportation, Manitoba packers have competition at the retail level from Alberta and Saskatchewan plants, while in the H.R.I. trade, competition stems from Alberta, Saskatchewan, Ontario, and the U.S.A.

To sum up, in the marketing of beef, the local packer has very little control in establishing selling prices. It is only his

versatility of product mix that will help him survive and when by-product market returns are continually strong, there is hope of a profit.

PORK: The pork manager's task is also a formidable one, however, with one exception. Hogs are generally cut into many cuts and a great deal of these cuts can be used in further value added products. Prices are established weekly and corrected daily to inventory levels and to replacement costs. The brokers' bulletins can be used as guidelines and distribution costs can be added, depending on the area to be serviced.

Carload pork unlike Eastern beef shipments is sold with fixed selling prices before being shipped. In many cases export prices are established first and orders produced to fill shipping dates.

VEAL & LAMB: Are supplied on a local basis in direct competition to Lambco of Alberta. Lambco slaughters and processes approximately 2,000 lambs per week and from 100-200 Provimi type veal calves per week when available.

CHICKEN: Historically, Ontario and Quebec were surplus producers and the Manitoba carload price on whole frozen cryovaced

chickens and frozen segments was basic Eastern cost plus freight to Manitoba. Any prices realized over this level was a windfall and local processors looked to western markets for additional sales at higher levels whenever possible. There have been occasions when local stores featured Eastern product while Saskatchewan and Alberta stores featured Manitoba product.

In review on frozen product, the live price is fixed, overheads are predetermined on volume and the selling price is set by another provincial market area.

Fresh product on the other hand is treated as a value added product and all overhead is passed on where possible.

Chicken is sold in fresh and frozen form as whole birds, 8-9-12 piece cut, segments back bone on and segments back bone off. A chicken breast is the only segment that is deboned on a broiler chicken and is sold skin on or off.(retail trade)

TURKEYS: Are mainly a seasonal commodity, however with the development of the broiler turkey, summer sales are a potential for barbecuing.

Prices are established in the same way as frozen chicken, and with Manitoba an export producer, there is no second chance if

a sale is missed. Therefore once the kill season starts in June sales representatives are actively involved in procurring orders for guaranteed shipments of future production.

GEESE: Two plants in Manitoba account for a major part of Canada's goose production. Geese are a seasonal item and when over produced as in past years will end up in storage. Northern Goose in Gimili has spent a considerable amount of money this year to develope further processed goose products. It is hoped that their industry will now become a 52 week operation instead of the traditional 7 week operation (required for slaughtering). Profits will now be derived hopefully from further processing as well as from Down sales to worldwide markets.

DUCKS: Canadian ducks are in short supply and used for weekly retail needs. American ducks are imported continually without any restrictions and are sold by the carload for retail features. Frozen surplus Canadian stock must be priced close to American, to appeal to retail buyers.

SCHEDULE I

DRESSED BEEF CARCASS CUT OUT ANALYSIS

(A)	Hind Quarter	= 49%
	Front Quarter	= 51%
	Side of Beef	= 100%
(B)	Front Quarter	= 100%
	Chuck of Beef	= 48%
	Rib of Beef	= 20%
	Plate, Brisket, Shank	= 32%
(C)	Hind Quarter	= 100%
	Hip of Beef	= 50%
	Loin of Beef	= 38%
	Flank of Beef	= 12%
(D)	Carcass of Beef	= 100%
	Chucks of Beef	= 24%
	Ribs of Beef	= 10%
	Plates of Beef	= 6%
	Briskets of Beef	= 6%
	Shanks of Beef	= 5%
	Hips of Beef	= 25%
	Loins of Beef	= 19%
	Flanks of Beef	= 5%

Prices applied to each product, will vary with market demand and surplus inventory levels.

SCHEDULE II

BLOCK READY CONVERSION PERCENTAGES
BASED ON LOCAL MARKET ESTABLISHED TRIMS

Sides of Beef	(A_1A_2)	79%	(A_3)	75%
Hinds of Beef		81%		78%
Fronts of Beef		77%		72%
Chucks of Beef		80%		73%
Ribs of Beef		82%		62%
Racks of Beef		83%		81%
Sirloin Butts of Beef		93%		
Hips of Beef		78%		75%
Loins of Beef (Flank off)		88%		

The dressed cooler cost of a steer or heifer would be the base price. Cut price would be determined by completing a dressed beef carcass cut out analysis.

A predetermined labour and packaging cost would be applied to the dressed carcass or cut cost and then the percentage figure would be applied to determine selling price.

(i.e., A_1 carcass cost $1.30 lb.)

Equation: $130 + (8-12¢) \div 79 = ($175 - $180)lb.

Each packer has his own set of costs to apply which from past history curently vary from 8-12¢ lb.

SCHEDULE III

MONTREAL SETTLEMENT PRICES

Example Nov. 21-25/83

Prices are applied to grades and by weight range.

STEERS	550/700 lbs	701/800 lbs	801/900 lbs	901/1000 lbs	1001/up lbs
A_1	137	135	131	125	122
A_2					
A_3	127				
A_4	122				
A_1X	132				
A_1V.B.	135				
B_1X					
B_1V.B.	122				
C_1X					
C_1V.B.	112				
HEIFERS				NA	NA
A_1A_2	135				
COWS					
D_1D_2	89^{35}				
D_3D_5	89^{35}				
D_4					
C_1					

In A Grade cattle price differentials normally are 10¢ lb. off for A_3 and 15¢ lb. off for A_4; if cattle are short in supply differentials become less.

SCHEDULE IV

YIELDS CURRENTLY USED TO CALCULATE DRESSED POULTRY COSTS FROM LIVE

Each Canadian plant may vary depending on equipment and method of cutting poultry into segments.

A & U Grade Chicken	75%
8-9-12 Piece Cut Chicken	65%
A & U Roasting Chicken	76%
A & U Fowl	75%
Fricasse Fowl	62%
Canner Pack Fowl	62-65%
A & U Broiler Turkeys	81%
A & U Hen Turkeys	81%
A & U Tom Turkeys	82%
Canner Pack Tom Turkeys	76%

In chicken the A Grade can vary from a low of 50% on Roasters to a high of 70% on Fryers. A rule of thumb is 60% A and 40% Utility.

Turkeys will usually grade out 80% A and 20% Utility.

Every plant has their own method of establishing a final actual cost. If the plant kills more than one type of bird (i.e., chicken & turkey) then a weighted differential must also be used.

SCHEDULE V

SOME SAMPLES OF CHICKEN SEGMENT CUTTING YIELDS USED TO CALCULATE SELLING PRICES AND TO ANALYSIS MARKET RETURNS

(A)	Breasts	34.31	(B)	Breasts Back Bone On	37.04
	Legs	29.75		Legs " " "	43.26
	Wings	12.06		Wings	11.62
	Necks & Backs	20.25		Necks	7.41
	Skin & Fat	1.56		Skin & Fat	
	Skrinkage	2.07		Shrinkage	.67
	TOTAL	100.00%		TOTAL	100.00%
(C)	Breasts	34.31	(D)	Breasts	28.41
	Thighs	16.31		Legs Back Bone On	43.18
	Drumsticks	13.44		Wings	14.61
	Wings	12.06		Necks & Back	6.49
	Necks & Backs	20.25		Skin & Fat	6.82
	Skin & Fat	1.56		Shrinkage	.49
	Shrinkage	2.07		TOTAL	100.00%
	TOTAL	100.00%			

Boneless Skinless Breasts yield 49% of whole bone in Breasts Back Bone out.

Boneless Skin on Breasts yield 57% of whole bone in Breasts Back Bone out.

SCHEDULE VI

BASIC COMMERCIAL TRIM PORK CUT OUT

Hogs are purchased hot weight, head on, leaf lard and kidneys in.

PRIME CUTS:

Hams R/on	22%	
Bellies R/on	14%	
Loins	15%	variation can range from 72-74%
Butts Bone in	8%	
Picnics Bone in Hock off	8%	
Side Ribs	4%	
	74%	

CUTTING CREDITS:

Front Hocks, Riblets, Feet, Neck Bones, Jowls, Back Fat, Butt Fat, Cut & Trim Fat, Leaf Lard, Bones, Kidneys, Head (Tongue & Cheek meat, Snout, Ears)	25½%
Shrink (Maximum allowable on cut)	½%
TOTAL	100 %

Maximum Shrink allowance from hot weight is 2½%.

Total allowable Shrink from hot weight to cut is 2 3/4%.

All cutting credits (sundary items) are priced and total value deducted from cost of Hog.

Add kill charge (which has been reduced by kill credits) plus cutting charge which should now equal value of prime cuts.

By adjusting figures to past market trends a value can be set for each of prime products.

SCHEDULE VII

LAMB CARCASS BREAK OUT INTO PRIMALS:

Long Cut Leg	32.75%
Loin Flank On	17.25%
Rib	12.25%
Breast	16.00%
Neck	3.25%
Shoulder & Shank	18.50%
TOTAL	100.00%

RETAIL CUTTING PERCENTAGES INTO CHOPS:

Delivered Weight	100.00%
Aged Weight	95.20%
Shrinkage	4.80%
Leg Chops	27.40%
Shoulder Chops	17.90%
Double Loin & Rib Chops	14.90%
Ground Lamb	13.10%
Shanks	3.60%
TOTAL RETAIL RECOVERY	76.90%
Bones & Fat	18.30%
Total Loss From Weight Received	23.20%

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A.W. Tremere

Market Forces Affecting Feed Prices in Manitoba

With the intensifying cost price squeeze on producers and dealers, sooner or later the issue of price comes up in every sale. Even when prices are competitive, every sales person encounters the producer or dealer who says "your price is too high, if you reduce your price maybe I will be in a position to buy".

Price for many people is an emotional issue. Maybe it is because price is such a tangible issue and can be measured and argued in more objective terms than subjective issues such as service or durability. Remember, it's not necessarily the facts that affect the customer's decision, it's his perception of the facts that counts, or what I call perceived value.

Preceived value

Farmers and retailers don't buy on price. They buy on value. Value expresses the relationship between what they pay and what they get for their money. Value consists of many attributes, both real and imagined, tangible and intangible.

Value is a perception. The customer must perceive what is being offered is worth the price. If he does, it is a good price. If he doesn't, or if a competitor offers a package that fulfills more of his needs for less cost, then invaribly he will say "your price is too high". Price itself is seldom the primary issue.

Even price shoppers who go around taking bids are actually looking for value. This will happen if they believe there is little difference among alternate suppliers. Even then, when they do negotiate a lower price, they still want the same or better service than what others get. Who can blame them?

Commodity-like products

The more commodity-like a product is, the more important price will likely be in the buyers' mind. When the customer has several places to buy exactly the same product/service package, price naturally becomes a critical factor. Some fertilizers and generic chemicals fall into this category and are quite susceptable to price buying.

Unfortunately, feed is often put into this catagory as well. Particularly by those who are not directly involved in selling feed and by producers who do not measure end results. My expereince is that those who do measure end

results such as those selling pure bred breeding stock, or have high producing dairy cows, etc, will seldom buy the cheapest feed on the market. In most cases, when one compares feed from different companies he is comparing 'apples to oranges'. Therefore, it is important that customers must understand what they are buying. It is the sales persons' job to clearly outline the total package of benefits the customers will receive, so the customer won't be making an invalid comparison. Comparing 'apples to oranges' may lead to an unwise purchase decision.

What are some of the factors that establish the price of feed?

(1) The Customer

The primary objective of all marketing operations is to bring about buying actions by the customer. Consideration of the customer is, therefore, the only logical beginning point in the analysis of any marketing problem. Each customer has different needs, wants, desires, preferences, and beliefs. Most successful feed companies make what they can sell. Very often this leads to many custom formulas. In terms of cost, these are more costly to the feed manufacturer in terms of shorter runs, more down time, and in many cases special ingredients are required. Seldom will the feed be the lowest price or a cheap feed. Invariably, the customer will ask for

addition of high quality ingredients, medication, or extra vitamins, etc. In some cases the customer will ask that the formula not contain certain ingredients which, at least in his eyes, to be considered lower quality.

(2) Product Policy of the Company

The product is a means whereby consumer needs or wants are satisfied. If I may use the pet food industry as an example, there are certain companies on the market who spend considerable dollars in promoting the quality of their product and make no attempt at being the cheapest on the market. On the other hand you have the generic "no name" brand that will likely be the lowest price. It is up to you to determine the quality to see if it is sufficient to meet your needs. I know all feed companies have the technical and manufacturing capabilities to produce an excellent quality product. These same companies can also produce feed at a cheap price, however, it will not be the same product or feed formula.

(3) Forces of the Market

The feed industry provides service to the animal and poultry producers and can only be as strong as the viability of the poultry and animal industry.

(a) Marketing Boards: Those sections controlled by marketing boards, such as broilers, layers, turkeys, and dairy, have resulted in a no-growth situation and the production limited to the consumption of meat, milk, and eggs within the province. The system has provided financial stability and orderly marketing of products.

Due to the pricing of the end product based on cost plus system, feed no longer represents more than 50 - 55% of the total cost of putting that bird to market. In all other areas of the world feed would represent 65 - 70% of the total cost. Granted, feed is still the single largest cost component, but only in Canada is its cost this low as a percentage of the selling price.

(b) Competition within the feed industry: The feed industry in Canada, and particularly in Manitoba, is in an overcapacity situation resulting in many companies competing for fewer and fewer feed tonnes each year. This should have resulted in very favorable feed prices to the producer as the feed industry is not a high profit oriented industry.

I understand that the feed industry has just gone through one of the most competitive price situations at a time when grain prices have been relatively low. In fact, the United States introduced the PIK program to reduce grain inventory which will raise the price of grain to the

producers. Therefore, the price of feed will be higher in 1984 than was experienced in 1982 and the first of half of 1983.

(4) Price of Commodities

The base price of feed will be greatly influenced by the price of corn and soybean meal on the Chicago market. You will find that the price that one pays for Canola meal or meat meal will be related to the price of soybean meal delivered into Winnipeg. The price one pays for wheat and barley to be used in feed will be influenced by the price of corn on the Chicago market delivered into Winnipeg. As you know the market has been in constant stage of ups and downs since the introduction of the PIK program and the drought in the United States. The temptation is to speculate and take position on the market. This is an individual decision and should not be used in establishing the price on a general basis. In my opinion one should use the current market price at all times and pick the same day and time each week or month you are doing the pricing. If you alterate between a Friday's close one week to a Tuesday's opening the next time, you will only cause confusion in the system and no one will understand how you arrive at the price of feed.

Pricing

On the surface, the best way to establish a price is the cost plus system based on the actual cost of the raw materials, fixed and variable manufacturing costs, interest, plus contribution to overhead and profits. On the short term this is great but eventually you will price yourself out of the market. Someone else will come up with a newer less costly way of doing the same thing, or worse, come up with a new improved substitute product that will take over the entire market. For example, vegetable oil in margerines replacing butter. However, one must determine the true cost of production and many will be surprised at this cost.

In conclusion, profit can only be earned by providing something the market accepts as value and is willing to pay for as such. This is done by leadership in making a unique or distinctive contribution to fill the needs of the customer.